

We claim:

1. A communication system comprising:
  - a subscriber device;
  - an access device; and
  - a policy server, wherein the policy server is operably coupled to determine a policy decision indicating whether the subscriber device can be admitted to a multicast group, and wherein the access device is operably coupled to control subscriber device access to the multicast group based upon the policy decision from the policy server indicating whether the subscriber device can be admitted to the multicast group.
2. The communication system of claim 1, wherein the policy decision for admitting the subscriber device to the multicast group is based upon an interface of the access device to which the subscriber device is coupled.
3. The communication system of claim 1, wherein the access device is operably coupled to admit the subscriber device to the multicast group if and only if the policy decision from the policy server indicates that the subscriber device can be admitted to the multicast group.
4. The communication system of claim 3, wherein the access device is operably coupled to establish appropriate multicast routes for receiving multicast information for the multicast group and forwarding the multicast information for the multicast group to the subscriber device upon admitting the subscriber device to the multicast group.
5. The communication system of claim 1, wherein:
  - the subscriber device is operably coupled to send a join request message to the access device for joining the multicast group;

the access device is operably coupled to receive the join request message from the subscriber device over an incoming interface and send a policy service request message to the policy server indicating at least the incoming interface and the multicast group;

5 the policy server is operably coupled to receive the policy service request message from the access device, determine the policy decision indicating whether the subscriber device can be admitted to the multicast group based upon at least the incoming interface and the multicast group indicated in the policy service request message, and send a policy service decision message to the access device including the policy decision indicating whether the subscriber device can be admitted to the multicast group; and

10 the access device is operably coupled to receive the policy service decision message from the policy server and admit the subscriber device to the multicast group if and only if the policy decision in the policy service decision message indicates that the subscriber device can be admitted to the multicast group.

15 6. The communication system of claim 5, wherein the join request message comprises an Internet Group Management Protocol (IGMP) join request.

20 7. The communication system of claim 5, wherein the policy service request message comprises a Common Open Policy Service (COPS) request message indicating at least the multicast group.

25 8. The communication system of claim 7, wherein the COPS request message comprises:

an address for the incoming interface;  
an index for the incoming interface; and  
an address for the multicast group.

30 9. The communication system of claim 5, wherein the policy service decision message comprises a Common Open Policy Service (COPS) decision message including the policy decision.

10. The communication system of claim 9, wherein the COPS decision message comprises a command code indicating whether to admit (install) the subscriber device or reject (remove) the subscriber device.

5 11. The communication system of claim 5, wherein the access device and the policy server are operably coupled to establish a policy service connection for exchanging policy service messages including the policy service request message and the policy service decision message.

10 12. The communication system of claim 11, wherein the access device is operably coupled to send a client open message to the policy server in order to open the policy service connection, and wherein the policy server is operably coupled to send a client accept message to the access device in order to accept the policy service connection.

15 13. The communication system of claim 12, wherein the client open message comprises a Common Open Policy Service (COPS) client-open message including a client type indicating that the access device is a multicast access point device, and wherein the client accept message comprises a COPS client-accept message.

20 14. The communication system of claim 5, wherein the access device is operably coupled to join the multicast group upon admitting the subscriber device to the multicast group.

25 15. The communication system of claim 14, wherein the access device is operably coupled to send a Protocol Independent Multicast (PIM) join request message upstream toward a rendezvous point device in order to join the multicast group.

16. A method for providing access control by an access device in a multicast communication system, the method comprising:

receiving a join request message for joining a multicast group from a subscriber device over an incoming interface;

5 obtaining from a policy server a policy decision indicating whether the subscriber device can be admitted to the multicast group; and

admitting the subscriber device to the multicast group if and only if the policy decision indicates that the subscriber device can be admitted to the multicast group.

10 17. The method of claim 16, wherein the join request message comprises an Internet Group Management Protocol (IGMP) join request message indicating the multicast group.

15 18. The method of claim 16, wherein obtaining the policy decision from the policy server comprises:

establishing a policy service connection to the policy server;

sending a policy service request message to the policy server indicating at least the multicast group; and

receiving a policy service decision message from the policy server indicating whether the subscriber device can be admitted to the multicast group.

20 19. The method of claim 18, wherein establishing the policy service connection to the policy server comprises:

sending a client open message to the policy server; and

receiving a client accept message from the policy server.

25 20. The method of claim 19, wherein the client open message comprises a Common Open Policy Service (COPS) client-open message including a client type indicating that the access device is a multicast access point device, and wherein the client accept message comprises a COPS client-accept message.

21. The method of claim 18, wherein the policy service request message comprises a Common Open Policy Service (COPS) request message indicating at least the multicast group.

5 22. The method of claim 21, wherein the COPS request message comprises:  
an address for the incoming interface;  
an index for the incoming interface; and  
an address for the multicast group.

10 23. The method of claim 18, wherein the policy service decision message comprises a Common Open Policy Service (COPS) decision message indicating the policy decision for the subscriber device.

15 24. The method of claim 23, wherein the COPS decision message comprises a command code indicating whether to admit (install) the subscriber device or reject (remove) the subscriber device.

20 25. The method of claim 16, wherein admitting the subscriber device to the multicast group comprises:  
joining the multicast group; and

25 establishing appropriate multicast routes for receiving multicast information and forwarding the multicast information to the subscriber device.

26. The method of claim 25, wherein joining the multicast group comprises:  
sending a Protocol Independent Multicast (PIM) join request message upstream toward a rendezvous point device in order to join the multicast group.

27. An apparatus comprising:  
an incoming interface;  
multicast group management logic operably coupled to receive a join request message for joining a multicast group from a subscriber device over the incoming interface;  
5 policy service logic operably coupled to obtain from a policy server a policy decision indicating whether the subscriber device can be admitted to the multicast group;  
and  
multicast routing logic operably coupled to admit the subscriber device to the multicast group if and only if the policy decision indicates that the subscriber device can be admitted to the multicast group.

10 28. The apparatus of claim 27, wherein the multicast group management logic comprises Internet Group Management Protocol (IGMP) logic, and wherein the join request message comprises an Internet Group Management Protocol (IGMP) join request message indicating the multicast group.

15 29. The apparatus of claim 27, wherein the policy service logic is operably coupled to send a policy service request message to the policy server indicating at least the multicast group and receive a policy service decision message from the policy server indicating whether the subscriber device can be admitted to the multicast group.

20 30. The apparatus of claim 29, wherein the policy service logic comprises extended Common Open Policy Service (COPS) logic.

25 31. The apparatus of claim 30, wherein the policy service request message comprises a COPS request message indicating at least the multicast group.

30 32. The apparatus of claim 31, wherein the COPS request message comprises:  
an address for the incoming interface;

an index for the incoming interface; and  
an address for the multicast group.

33. The apparatus of claim 29, wherein the policy service decision message comprises  
5 a COPS decision message indicating the policy decision for the subscriber device.

34. The apparatus of claim 33, wherein the COPS decision message comprises a  
command code indicating whether to admit (install) the subscriber device or reject  
(remove) the subscriber device.

10 35. The apparatus of claim 27, wherein the multicast routing logic is operably coupled  
to join the multicast group and establish appropriate multicast routes for receiving  
multicast information and forwarding the multicast information to the subscriber device.

15 36. The apparatus of claim 35, wherein the multicast routing logic comprises Protocol  
Independent Multicast (PIM) logic.

20 37. The apparatus of claim 36, wherein the multicast routing logic is operably coupled  
to send a PIM join request message upstream toward a rendezvous point device in order to  
join the multicast group.

25 38. The apparatus of claim 29, wherein the policy service logic is operably coupled to  
establish and maintain a policy service connection with the policy server for exchanging  
policy service messages including the policy service request message and the policy  
service decision message.

30 39. The apparatus of claim 38, wherein the policy service logic is operably coupled to  
send a client open message to the policy server in order to establish the policy service  
connection.

40. The apparatus of claim 39, wherein the client open message comprises a Common Open Policy Service (COPS) client-open message including a client type indicating that the apparatus is a multicast access point device.

41. A computer program for controlling a computer system, the computer program comprising:

multicast group management logic programmed to receive a join request message for joining a multicast group from a subscriber device over an incoming interface;

5 policy service logic programmed to obtain from a policy server a policy decision indicating whether the subscriber device can be admitted to the multicast group; and

multicast routing logic programmed to admit the subscriber device to the multicast group if and only if the policy decision indicates that the subscriber device can be admitted to the multicast group.

10 42. The computer program of claim 41, wherein the multicast group management logic comprises Internet Group Management Protocol (IGMP) logic, and wherein the join request message comprises an Internet Group Management Protocol (IGMP) join request message indicating the multicast group.

15 43. The computer program of claim 41, wherein the policy service logic is programmed to send a policy service request message to the policy server indicating at least the multicast group and receive a policy service decision message from the policy server indicating whether the subscriber device can be admitted to the multicast group.

20 44. The computer program of claim 43, wherein the policy service logic comprises extended Common Open Policy Service (COPS) logic.

25 45. The computer program of claim 44, wherein the policy service request message comprises a COPS request message indicating at least the multicast group.

30 46. The computer program of claim 45, wherein the COPS request message comprises:  
an address for the incoming interface;  
an index for the incoming interface; and  
an address for the multicast group.

47. The computer program of claim 43, wherein the policy service decision message comprises a COPS decision message indicating the policy decision for the subscriber device.

5 48. The computer program of claim 47, wherein the COPS decision message comprises a command code indicating whether to admit (install) the subscriber device or reject (remove) the subscriber device.

10 49. The computer program of claim 41, wherein the multicast routing logic is programmed to join the multicast group and establish appropriate multicast routes for receiving multicast information and forwarding the multicast information to the subscriber device.

15 50. The computer program of claim 49, wherein the multicast routing logic comprises Protocol Independent Multicast (PIM) logic.

51. The computer program of claim 50, wherein the membership logic is programmed to send a PIM join request message upstream toward a rendezvous point device in order to join the multicast group.

20 52. The computer program of claim 43, wherein the policy service logic is programmed to establish and maintain a policy service connection with the policy server for exchanging policy service messages including the policy service request message and the policy service decision message.

25 53. The computer program of claim 52, wherein the policy service logic is programmed to send a client open message to the policy server in order to establish the policy service connection.

54. The computer program of claim 53, wherein the client open message comprises a Common Open Policy Service (COPS) client-open message including a client type indicating that the apparatus is a multicast access point device.

55. A method for providing access control by a policy server in a multicast communication system, the method comprising:

establishing a policy service connection with an access device;  
receiving from the access device a policy service request message indicating at least a multicast group associated with a subscriber device;

5 determining a policy decision indicating whether the subscriber device can be admitted to the multicast group based upon at least the multicast group indicated in the policy service request message; and

10 sending a policy service decision message to the access device including the policy decision indicating whether the subscriber device can be admitted to the multicast group.

56. The method of claim 55, wherein the policy service request message comprises a Common Open Policy Service (COPS) request message indicating at least the multicast group.

15 57. The method of claim 56, wherein the COPS request message comprises:  
an address for the incoming interface;  
an index for the incoming interface; and  
an address for the multicast group.

20 58. The method of claim 55, wherein the policy service decision message comprises a Common Open Policy Service (COPS) decision message indicating the policy decision for the subscriber device.

25 59. The method of claim 58, wherein the COPS decision message comprises a command code indicating whether to admit (install) the subscriber device or reject (remove) the subscriber device.

30 60. The method of claim 55, wherein establishing the policy service connection with the access device comprises:

receiving from the access device a client open message; and  
sending to the access device a client accept message;

61. The method of claim 60, wherein the client open message comprises a Common  
5 Open Policy Service (COPS) client-open message including a client type indicating that  
the access device is a multicast access point device, and wherein the client accept message  
comprises a COPS client-accept message.

62. An apparatus comprising:  
a policy database containing policy information; and  
policy service logic operably coupled to determine a policy decision indicating  
whether a subscriber device can be admitted to a multicast group based upon the policy  
information contained in the policy database.

63. The apparatus of claim 62, wherein the policy service logic comprises:  
connection establishment logic operably coupled to establish a policy service  
connection with the access device;  
receiving logic operably coupled to receive a policy service request message from  
an access device indicating at least a multicast group associated with the subscriber device;  
policy determination logic operably coupled to determine a policy decision  
indicating whether the subscriber device can be admitted to the multicast group based  
upon the policy information contained in the policy database and at least the multicast  
group indicated in the policy service request message; and  
sending logic operably coupled to send a policy service decision message to the  
access device including the policy decision indicating whether the subscriber device can be  
admitted to the multicast group.

64. The apparatus of claim 63, wherein the policy service request message comprises a  
Common Open Policy Service (COPS) request message indicating at least the multicast  
group.

65. The apparatus of claim 64, wherein the COPS request message comprises:  
an address for the incoming interface;  
an index for the incoming interface; and  
an address for the multicast group.

66. The apparatus of claim 63, wherein the policy service decision message comprises a Common Open Policy Service (COPS) decision message indicating the policy decision for the subscriber device.

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67. The apparatus of claim 66, wherein the COPS decision message comprises a command code indicating whether to admit (install) the subscriber device or reject (remove) the subscriber device.

68. The apparatus of claim 63, wherein the connection establishment logic is operably coupled to receive from the access device a client open message and send to the access device a client accept message.

69. The apparatus of claim 68, wherein the client open message comprises a Common Open Policy Service (COPS) client-open message including a client type indicating that the access device is a multicast access point device, and wherein the client accept message comprises a COPS client-accept message.

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70. A computer program for controlling a computer system, the computer program comprising:

5 policy service logic programmed to determine a policy decision indicating whether a subscriber device can be admitted to a multicast group based upon policy information contained in a policy database.

71. The computer program of claim 70, wherein the policy service logic comprises:

connection establishment logic programmed to establish a policy service connection with the access device;

receiving logic programmed to receive a policy service request message from an access device indicating at least a multicast group associated with the subscriber device;

10 policy determination logic programmed to determine a policy decision indicating whether the subscriber device can be admitted to the multicast group based upon the policy information contained in the policy database and at least the multicast group indicated in the policy service request message; and

15 sending logic programmed to send a policy service decision message to the access device including the policy decision indicating whether the subscriber device can be admitted to the multicast group.

20 72. The computer program of claim 71, wherein the policy service request message comprises a Common Open Policy Service (COPS) request message indicating at least the multicast group.

25 73. The computer program of claim 72, wherein the COPS request message comprises:

- an address for the incoming interface;
- an index for the incoming interface; and
- an address for the multicast group.

74. The computer program of claim 71, wherein the policy service decision message comprises a Common Open Policy Service (COPS) decision message indicating the policy decision for the subscriber device.

5 75. The computer program of claim 74, wherein the COPS decision message  
comprises a command code indicating whether to admit (install) the subscriber device or  
reject (remove) the subscriber device.

76. The computer program of claim 71, wherein the connection establishment logic is programmed to receive from the access device a client open message and send to the access device a client accept message.

77. The computer program of claim 76, wherein the client open message comprises a Common Open Policy Service (COPS) client-open message including a client type indicating that the access device is a multicast access point device, and wherein the client accept message comprises a COPS client-accept message.

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78. A data signal comprising a policy service request message for requesting a policy decision in a multicast communication system, the policy service request message comprising at least a multicast group indicator.

5 79. The data signal of claim 78, wherein the policy service request message comprises a Common Open Policy Service (COPS) request message including at least the multicast group indicator.

10 80. The data signal of claim 79, wherein the COPS request message comprises:  
an address for the incoming interface;  
an index for the incoming interface; and  
an address for the multicast group.